**Disease: Anthrax***

***This organism is a potential bioterrorist agent. See "Special Considerations for Bioterrorism" on page 4.** This is a zoonotic disease that is seen most often among herbivores, with humans as accidental hosts. Anthrax is usually an occupational disease of those working with contaminated hair, wool, or hides of infected animals. Cutaneous anthrax in humans is very uncommon, and inhalation anthrax is very rare. Anthrax from a bioterrorist event would most likely be in the form of pulmonary (inhalation) disease. Anthrax is the most common agent mentioned in hoax bioterrorist threats.

**Synonyms:** Malignant carbuncle, chabron, woolsorters' disease, malignant edema, Milzbrand

**Clinical Features:** There are three forms of the disease, cutaneous, gastro-intestinal, and inhalation. Each form has specific features.

Cutaneous: The most common form and represents 90% of human infection. There is a history of a cut or abrasion, usually on the arms, hands, neck or face. The clinical presentation is so characteristic that the diagnosis is rarely missed by physicians familiar with the disease. The exposed part of the skin begins to itch and there is a papule at the inoculation site. The papule becomes a vesicle and then a depressed, black, non-painful eschar 1-3 cm diameter that leaves a permanent scar. There may be surrounding edema and draining lymph nodes may become enlarged. If untreated, septicemia and death can occur in 5-20% of cases. If treated, fatalities are extremely rare.

Gastro-intestinal: This is very rare and tends to occur as explosive foodborne illness outbreaks with a history of eating meat from infected animals. Nausea, vomiting, diarrhea (often bloody), and stomach cramps are seen with the intestinal form and tissue necrosis and edema in the cervical area of the oropharyngeal form. There are no specific premonitory signs to distinguish it from other foodborne illness. However, septicemia and death occur in 25-75% of cases. There is no evidence that is can be spread from milk.

Inhalation: This biphasic form is most likely to be seen as a bioterrorist attack, but can occur whenever spores are inhaled. The first symptoms are mild, non-specific, and resemble those of an upper respiratory tract infection (i.e., the common cold). Three to five days later, symptoms become more severe with acute respiratory distress, fever, shock, and death. There is often X-ray evidence of mediastinal widening. Treated or untreated at this stage, the fatality rate is nearly 100%.

**Organism:** *Bacillus anthracis*, a Gram positive, spore-forming non-motile rod. The bacteria is difficult to eradicate and can last for years in the environment. Animals (especially herbivores) are the most common reservoir. Death by anthrax is caused by the toxin it produces.

**Laboratory Test(s):** Culture of blood, lesions, or discharges. KDHEL provides culture testing. Rapid identification of the organism in materials used in bioterrorist threats is not currently available at KDHEL.

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**Treatment:** Intravenous penicillin (4 million units q4h for 7-10 days) is preferred, but ciprofoxacin (500 mg po bid ) or doxycycline (200 mg iv then 100 mg iv tid) can be used to treat systemic symptoms. The earlier treatment is begun, the more likely it is to be effective. Topical antibiotics applied to the eschar of the cutaneous form are ineffective for cutaneous anthrax.

**Incubation Period:** Usually 2-5 days, although it can be as little as one day or up to 60 days.

**Mode of Transmission:** Animals dying of anthrax produce enormous quantities of bacteria in their tissues. If the carcass is opened, the bacilli sporulate, contaminating the environment. Contaminated soil, contaminated animal products (including hides, fur, food), or environmental contamination by spores are also sources of the bacteria. The bacterial spores prefer alkaline environments (pH > 6) with abundant organic material, but can survive almost anywhere. Human to human transmission is extremely rare, even with pulmonary disease. This is an agent that could be weaponized for biological terrorism.

**Period of Communicability:** Essentially none from human-to-human contact. Environments can remain contaminated with spores for decades.

**Susceptibility:** Unknown. Second attacks are rare. Vaccinated individuals should be considered potentially susceptible, especially to inhalation anthrax.

**Occurrence:** Worldwide. There are endemic areas of the world, mostly in economically developing nations where it also occurs in animals. Anthrax in animals occurs rarely in the U.S.

**Outbreak criteria:** **A single case of inhalation anthrax is so unusual that it should be reported and investigated immediately as a potential bioterrorist event.** Two or more cases of cutaneous or gastrointestinal anthrax with a common or suspected common source should be investigated as an outbreak.

**Surveillance Case Definition:** A confirmed case is one with clinically compatible signs for any of the forms and laboratory confirmation.

Clinical criteria: *Cutaneous*: A skin lesion evolving over 2-6 days from a papule, to a vesicle, to a depressed black eschar.
*Gastro-intestinal*: Severe abdominal distress followed by fever and septicemia.
*Inhalation*: A brief prodrome resembling an upper respiratory illness followed by hypoxia and dyspnea with radiographic evidence of mediastinal widening.

Laboratory criteria: Isolation of **Bacillus anthracis** from a clinical specimen, **or** demonstration of *B. anthracis* by immunoflourescence, **or** Anthrax electrophoretic immunotransblot (EITB) reaction to antigen **and/or** lethal band factors in at least one serum sample.

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**Case Investigation:** Search for occupational sources of infection including a history of exposure to imported animal hides, skins, hair, leather, or bone meal. There have been animal cases in Kansas and the last human case in Kansas was reported in 1972. If an occupational source cannot be found, bioterrorism is likely.

**Methods of Control:** Prophylaxis may be indicated for non-immunized susceptible persons in the event of a biological attack. Ciproflaxacin (500 mg po bid) or doxycylcline (100 mg po bid) should be given for at least six weeks. A killed vaccine is available for prevention of cutaneous anthrax, but is recommended only for those at risk for exposure (such as those working with imported hides from endemic areas or laboratory employees working with the bacillus). Its efficacy against inhalation anthrax is not established. The vaccine is given subcutaneously at 0, 2, and 4 weeks, then again at 6, 12, and 18 months followed by annual boosters. There is an animal vaccine available, but it should **NOT** be given to humans.

**Isolation:** Wound dressings should be incinerated, autoclaved, or disposed of as biohazardous waste.

**Quarantine:** None, it is not spread person-to-person. Quarantine is inappropriate.

**Follow-up:** Potentially exposed individuals should be followed for symptoms of infection.

**Reporting Requirements:**

1. Report **immediately** by telephone to 1-877-427-7317 or 785-296-2951.
   **If this is a possible bioterrorist attack**, you should make an immediate telephone report directly to the State Epidemiologist by pager at: 785-249-8903. If there are animals potentially exposed, contact the Kansas Livestock Commissioner immediately at 785-296-2326

2. Complete Kansas Notifiable Disease Form or enter into HAWK.

3. FAX form to: 1-877-427-7318, or 785-291-3775

4. Mail form to: Epidemiologic Services Section - KDHE
   Landon State Office Building, Room 1051S
   900 SW Jackson Street
   Topeka, KS 66612-1290

5. An isolate of this organism is not required to be sent to the KDHE Division of Health and Environmental Laboratories (KDHEL). However, KDHEL is equipped to handle this organism. To confirm the diagnosis using KDHEL, contact them at 785-296-1620. Follow their specific procedures for handling and sending isolates. The mailing address of KDHEL is:

**Continued**

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**Reporting Requirements (cont.):**

Division of Health and Environmental Laboratories
Kansas Department of Health and Environment
Forbes Field, Building #740
Topeka, KS 66620-0001)

6. For technical assistance questions, call 785-296-2951 or 1-877-427-7317.

***Special Considerations for Bioterrorism:**

**Identification and Reporting:**

An announced threat of dissemination, though most likely a hoax, should be taken seriously and KDHE and the local office of the FBI should be contacted immediately.

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|---|---|---|
| KDHE: | Routine working hours: | 785-296-2951 |
| | 24 Hours a day: | 1-877-427-7317 |
| FBI 24-hour duty officer: | | 816-512-8200 |

**A single diagnosed or suspected case of inhalation anthrax is so unusual that it should be reported and investigated immediately as a potential bioterrorist event.** In such a circumstance, contact one of the following numbers (all are staffed 24 hours a day, 365 days a year) immediately in order of priority as shown:

1. Kansas State Epidemiologist: 785-249-8903
2. KDHE Epidemiologist On-Call: 1-877-427-7317
3. CDC Bioterrorism response coordinator hotline: 404-639-0385

**Likely Bioterrorist Scenarios:**

Airborne: Anthrax spores have several characteristics suitable for a biologic weapon, and it has been developed as a biological warfare agent by Japan, the United Kingdom, the U.S., Iraq and Russia. A bioterrorist attack will most likely take the form of dissemination of an aerosol among a gathering of people or over a highly populated area. Infection will most likely present as inhalation anthrax.

Foodborne/Waterborne: If anthrax is suspected as a food contaminant, efforts to determine the source food

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## Likely Bioterrorist Scenarios (cont.):

will be critical. Under natural circumstances, meats would be the only suspect foods. However, in a bioterrorism situation with deliberate contamination, all foods and beverages must be considered.

**Safety Considerations for Public Health and Other Health Care Professionals:**

Because anthrax is not transmitted person-to-person, public health, other health care, and emergency response personnel are not likely to be at risk in the investigation of a typical announced threat (delivery of a powdery substance to a work site) or the investigation of a scene implicated in an unannounced outbreak. The possible exception to this rule would be a terrorist mechanism designed to continually disseminate spores into an enclosed space over an extended period of time.

## Event Response/Control Measures:

Whether a bioterrorist event is announced or unannounced, local public health officials should play a central role in the event response and in the determination of appropriate control measures.

Definition of the population-at-risk:

This will be crucial task in such a situation, and will be essential to guide response activities. Public health authorities will play the lead role in this effort, but will consult with law enforcement, emergency response and other professionals in the process. The definition of the population-at-risk may have to be re-evaluated and redefined at various steps in the investigation of, assessment of, and response to a bioterrorist event.

Once a mechanism and scope of delivery have been postulated, symptomatic and asymptomatic potentially exposed individuals can be identified and assessed for treatment or chemoprophylaxis, as well as control measures.

Control measures which should be addressed are:

Decontamination: Rarely necessary, even in announced threats. However, if there is a high level of suspicion that individuals have been contaminated, those potentially contaminated should shower with soap and water immediately. Clothing, shoes and personal articles should be placed in a plastic bag, sealed, and labeled with the person's name and contacting information.

Post-exposure prophylaxis: In most anthrax threat situations, PEP is not recommended. However, if the level of suspicion is high that an exposure has taken place, potentially exposed individuals should begin antimicrobial prophylaxis if a definitive determination cannot be made within 24

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## Event Response/Control Measures (cont.):

hours. If the threat of actual exposure is highly credible or confirmed, exposed persons should begin antimicrobial prophylaxis and be vaccinated as soon as possible.
PEP: Ciproflaxacin (500 mg po bid) or doxycylcline (100 mg po bid) should be given for at least six weeks and vaccine should be given at 0, 2, and 4 weeks. Prophylaxis for inhalation anthrax must be given within the first three days (during the prodromal phase) to be effective. Prophylaxis after that time will be ineffective.

Isolation: None

Quarantine: None

Other public health activities:

Line lists: A central responsibility of the LHD staff is to maintain detailed line lists of cases, suspect cases, exposed, and potentially exposed individuals with accurate identifying and locating information as well as appropriate epidemiological information. These lists will be essential for early identification of infection among the exposed.

**Pharmaceuticals:**

In the event of an outbreak of anthrax, adequate quantities of appropriate antibiotics will be procured from the CDC National Pharmaceutical Stockpile Program. Procurement, storage, and distribution will be coordinated through the Kansas Department of Health and Environment. Local and state public health officials must play a central role in determining which individuals should have priority for receipt of limited pharmaceuticals.